**3.5 Optimization**

1. In your own words, explain optimization.

2. Explain the process for optimizing something.

3. Find two positive numbers whose product is 192 and whose sum is a minimum.

4. Find two positive numbers where the second number is the reciprocal of the first and their sum is a min.

5. Mr. Berres tired out of teaching and got a new job at the Post Office. Since the Post Office is very concerned about package size and maximizing the amount of boxes they can fit on each plane, they consulted the man who most consider to be a genius. Mr. Berres informed them that their dilemma boils down to a very simple calculus problem. They wanted to maximize the amount of volume that they could fit into a box that has a surface area of 150 square inches. Mr. Berres walked away whistling because he knew exactly what to do. What did he tell them? Assume the base of the box is a square.

6. One day, John’s family wished to build a new corral for the purpose of roping goats. They want it to be 3 adjacent rectangular corrals (as in the figure). There is only 700 feet of fence, though. What dimensions maximize the area inside the corral by only using 700 feet of fencing?

7. After years of working at the barbeque joint, Tyler has saved enough money to buy a franchise of his own. The profit he can expect to attain is given by the model. This model is accurate from the time she purchases the franchise until 25 years later. During what year can he expect to make the most profit?

8. Mr. Berres has a brother that likes to make and shoot his own fireworks for a hobby. Sometime ago, Mr. Berres was watching his brother shoot these fireworks he realized that his un-nerdy brother was fusing his fireworks to explode at a height that was not as high as they would potentially travel. Since the path of these artillery shells is best modeled by a parabola, he used the model to approximate the flight path based on the data he received about initial velocity, etc…What height did he tell his brother was the highest that his fireworks would fly if the model is accurate for 

9. Hunter has 2 dogs that she is trying to keep in a fence. The problem is that she does not have enough fencing to make a rectangle so she is going to use the side of her house for part of the fence. The house’s side only measures 65 feet so the fenced area cannot be any longer than that. She has 108 feet of fence and doesn’t need a gate, since the house has a door on the fenced side. What values for length and width produce the max area for her little doggies to get along?